(Ref # 1) List of Pipe Products Produced at each Plant

Plant and Address	Applicable Products made to M252 and M294
1 William Donnelly Pkwy Waverly, NY 14892	12" – 24" Type C,CP ; 12" – 60" Type S,SP; 4" – 10" Type C,CP, 10" Type S,SP
30 Precision Drive N. Springfield, VT 05150	12" – 24" Type C,CP ; 12" – 30" Type S,SP; 4" – 10" Type C,CP, 10" Type S,SP
12370 Jackson TR 172 Findlay, OH 35839	12" – 24" Type C,CP ; 12" – 30" Type S,SP; 4" – 10" Type C,CP, 4" - 10" Type S,SP
5816 Highway 70 East Mebane, NC 27302	12" – 24" Type C,CP ; 12" – 60" Type S,SP; 4" – 10" Type C,CP, 10" Type S,SP
433 Olive St Findlay, OH 45839	12" – 24" Type C,CP ; 12" – 60" Type S,SP; 4" – 10" Type C,CP, 10" Type S,SP
1013 West 11th Ave Cordele, GA 31015	12" – 24" Type C,CP ; 12" – 30" Type S,SP; 4" – 10" Type C,CP, 4" - 10" Type S,SP
140 Vineland Bakersfield, CA 93307	12" – 24" Type C,CP ; 12" – 60" Type S,SP; 4" – 10" Type C,CP, 10" Type S,SP
6001 Belmore St. S.W. Olympia, WA 98512	12" – 24" Type C,CP ; 12" – 60" Type S,SP; 4" – 10" Type C,CP, 10" Type S,SP
2340 E. US Hwy 40 Brazil, IN 47834	12" – 24" Type C,CP ; 12" – 30" Type S,SP; 4" – 10" Type C,CP, 4" - 10" Type S,SP
801 Hickey Yoakum, TX 77995	12" – 24" Type C,CP ; 12" – 60" Type S,SP; 4" – 10" Type C,CP, 10" Type S,SP
1001 Timberlake Road Fairmont, MN 56031	12" – 24" Type C,CP ; 12" – 30" Type S,SP; 4" – 10" Type C,CP, 4" - 10" Type S,SP
Highway 3 Northwest Oelwein, IA 50662	4" –8" Type C,CP
5695 Highway 61 S Vicksburg, MS 39180	12" – 24" Type C,CP ; 12" – 30" Type S,SP; 4" – 10" Type C,CP, 4" - 10" Type S,SP
1 Ulmann Drive Sebring, Fl	12" – 24" Type C,CP ; 12" – 60" Type S,SP; 4" – 10" Type C,CP, 10" Type S,SP

Hancor®	WI: RM-WI-2	
	Page 1 of 4	
TITLE: RAW MATERIAL RECEIVING	Revision Date: 5-08-02 Revision Level: 1	
Issued by: Eileen Witter	Approved by:	Date: 7-24-00

1.0 PURPOSE/SCOPE

To provide detailed instructions on the correct manner in which to safely receive, unload and store raw material at each branch location. Additionally, this procedure will detail the steps to take when a material is determined to be a safety hazard. See Flow Chart at end of document to further explain the process when dealing with hazardous materials.

2.0 RESPONSIBILITY

Branch Raw Material Coordinators, along with Plant Receiving Department are responsible for this task.

3.0 SAFETY

Make sure that the person receiving the raw material is trained in forklift safety before operating a forklift. Seat Belt usage is required along with safety glasses. Safety chocks are to be used under the trailer wheels of the trailer. For portable docks, use a chain to secure the ramp to the trailer.

4.0 PROCEDURE

a) On all incoming loads of raw material, you must insure that the carrier has all of the necessary paperwork that includes the Purchase Order Number along with the certified weights. If certified weight is not available, weigh the truck full and then weigh it empty. See flow chart at end of this document for further visual explanation of this process (relating primarily to regrinds)

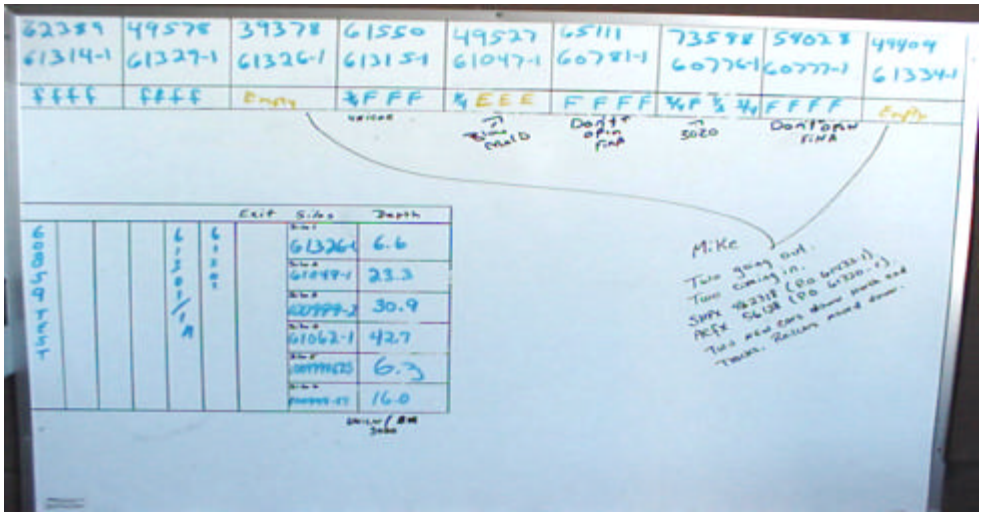
b) Once you have established that the paperwork matches the load you are receiving, you may prepare to unload the trailer.

c) Have the driver back up to the dock. Attach the safety chain on the portable ramp to the trailer. Put wheel chocks under the trailer wheels to prevent truck movement and accidents. Unload each gaylord of material and place the boxes in an area in your warehouse that has been established by the Raw Material Coordinator or Warehouse Person. This area may be where the material will stay or be an area where the material will be sampled then moved to the location determined by the Raw Material Coordinator or Warehouse Person.

d) If the load is a regrind material (not concentrate or virgin material) then remove the first 12 boxes and inspect them for any hazardous warning labels, any foul or irritating odors, and a liquid seeping from around the bottom of the boxes. If none of these are present continue on with unloading the rest. Watch the remaining boxes for these symptoms. If there are these symptoms present, within the first 12 boxes or remaining boxes, then this load can be rejected. Notify the Raw Material buyer immediately.

e) After all of the boxes have been removed from the trailer, check the box count against the bill of lading and sign the Bill of Lading if correct. If Bill of Lading is not correct modify actual count on Bill of Lading and in JD Edwards system.

f) Sample each box by probing with grain probe and I.D. each box per RM-WI-3.



g) If the material looks oily or has any other potentially hazardous materials , the RM coordinator has the right to reject this load. The RM coordinator will contact the Raw Material buyer immediately if the load will be rejected. Disposition of material will be determined by buyer and supplier.

h) Store the boxes in the location assigned by the Raw Material Coordinator or Warehouse Person.

i) The regrind material, after test results are received back from lab can be used for production of pipe.

j) If the material causes problems during production such as releasing a strong irritating smell after heating or intense smoke from the extruder the operator will immediately shut the line down and have the area affected cleared of smoke and or smell by ventilating the area. The operator will contact the raw material coordinator, supervisor, buyer , etc.

k) Once the area is clear, the operator will drain the material system (hopper, dryer, line, blender, etc) of this material and collect two samples to be forwarded to the buyer and Central lab. Again, disposition will be determined by the buyer and supplier.

l) When receiving rail cars verify car number with PO# and note car location on inventory tracking board. For sampling rail cars refer to RM-WI-3.

m) When receiving hopper trucks, you must insure that the carrier has all of the necessary paperwork that includes the Purchase Order Number along with the certified weights. Sample truck per RM-WI-3.

5.0 NON-CONFORMING RESPONSE

If during the receiving procedure, you find that the Purchase Order Number is not correct or that it belongs to another location, verify with the driver that the paperwork goes with that particular load and then notify the buyer. If the box count does not match the paperwork, make the corrections as noted in RM-WI-2, 4.0-d and proceed to unload. Always make sure that the driver of the truck has certified scale tickets, or send the driver to a location where certified weights can be obtained. Hazardous materials must be dealt with as prescribed in the above steps.

6.0 RELATED DOCUMENTATION

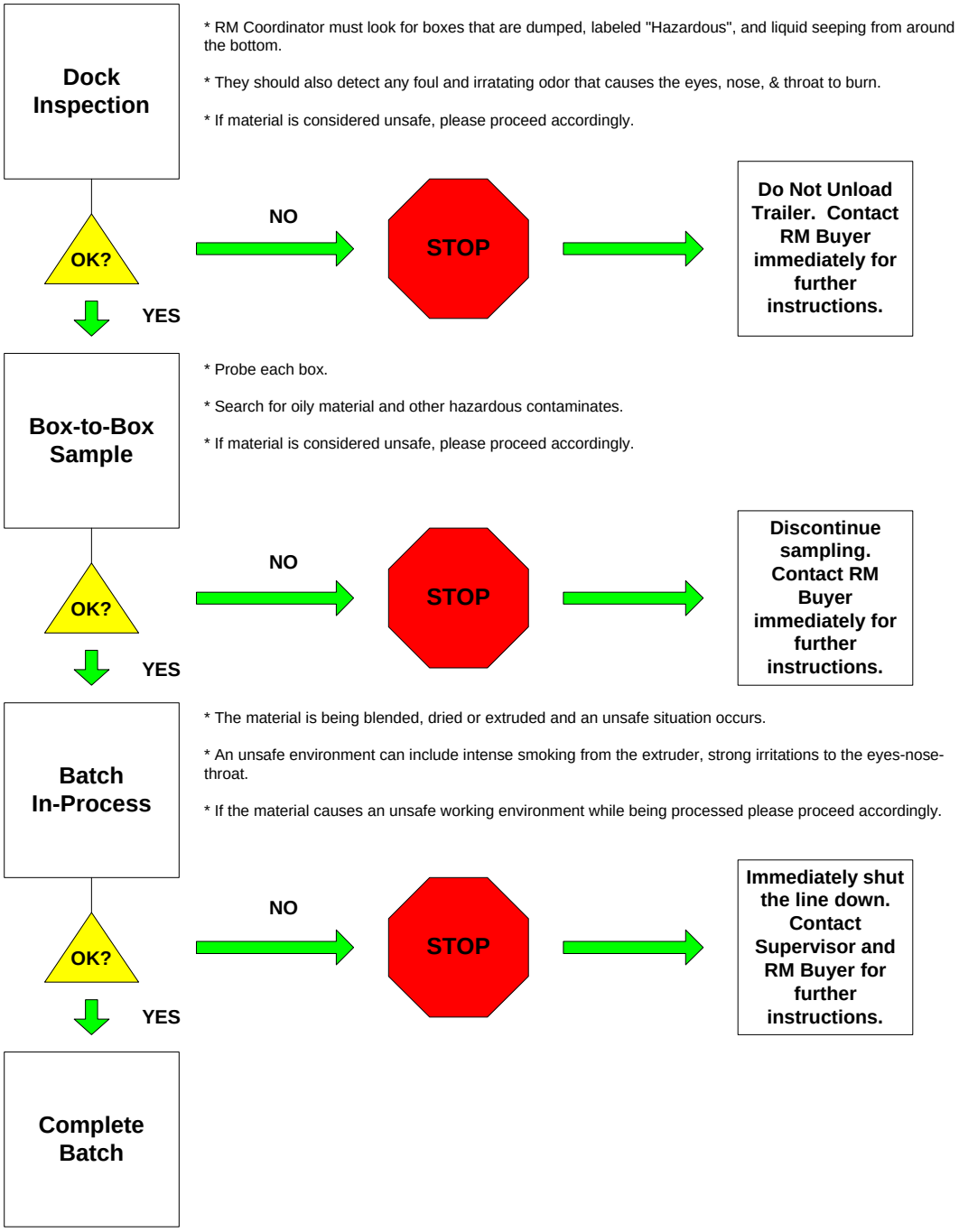
- Certified Weight Scale Tickets
- Purchase Order Number
- RM-WI-3
- Flow Chart – next page

7.0 CHANGE HISTORY

This document was originally issued on July 24, 2000 at Revision 0. It has been revised as follows:

DATE	REVISION DETAILS	REVISION LEVEL
5-8-02	Added flow chart and verbiage relating to sampling and disposition when hazardous materials are found in the purchased materials.	1

Raw Material (HDPE Regrind) Receiving



1.0 PURPOSE/SCOPE

To provide clear instructions on the sampling methods for rail cars, hopper trucks and gaylord boxes. Sampling technique is important. A good sample will be representative of the entire load of material. This procedure also describes what to look for and how to deal with materials (regrinds primarily) that may have hazardous materials in them. See RM-WI-2 for additional details regarding this.

2.0 RESPONSIBILITY

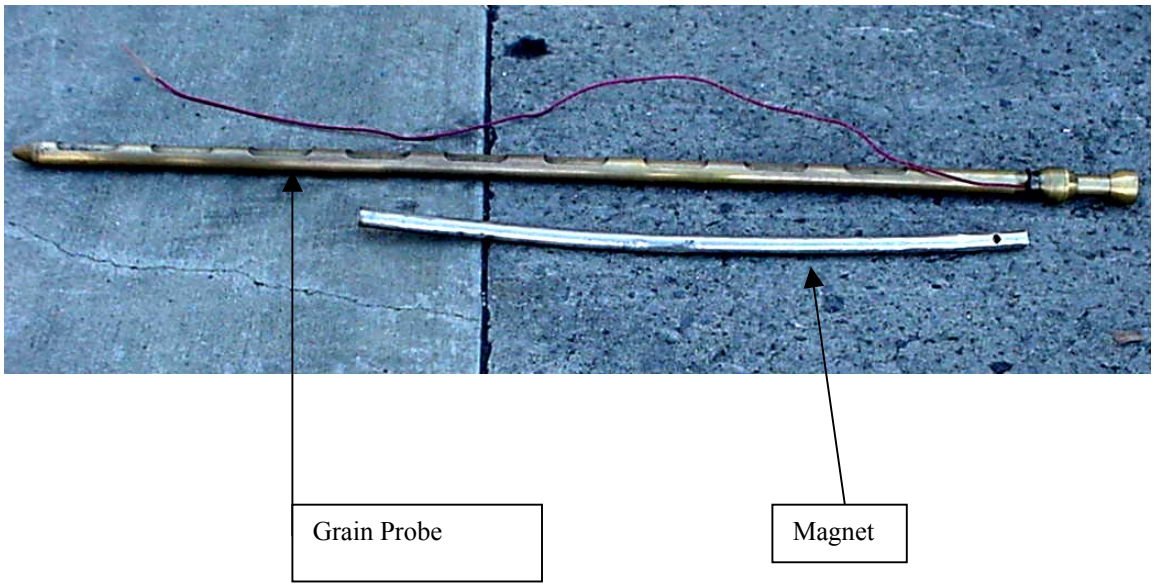
The Raw Material Coordinator will assure that the raw material is sampled correctly per this instruction.

3.0 SAFETY

Railcars will not be sampled from the top. Therefore, no one will need to climb on the railcars. If material is suspected of having a hazardous material or irritating odor contact buyer and send sample to lab for further analysis.

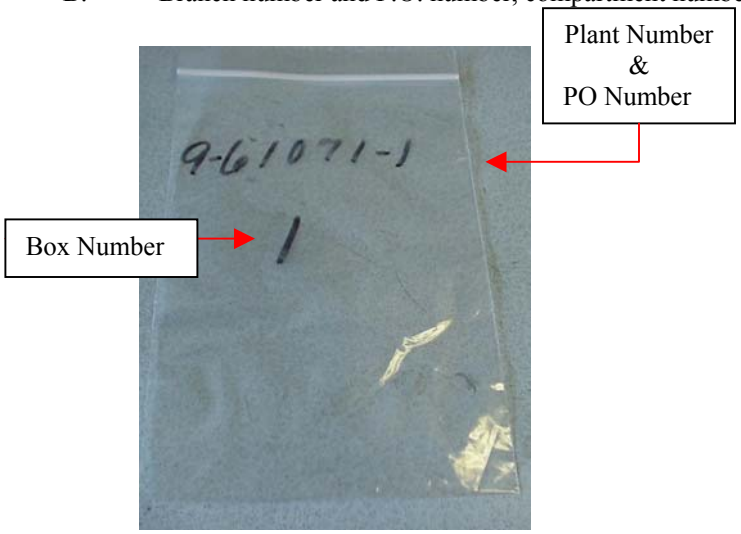
4.0 PROCEDURE

1. The equipment you will need for sampling is as follows: grain probe, magnetic probe, sample bags, and permanent markers.



2. Mark sample bags with the following information:

   A. Branch number and P.O. number and box number – for gaylord and hopper truck samples
   B. Branch number and P.O. number, compartment number, of the top of the railcar..



3. For the sampling frequency of materials follow LAB-F-10 Raw Material Sampling & Testing Guidelines.

4. **To sample a hopper truck**, obtain material sample from driver. The driver can obtain sample if necessary from the traverse line underneath the hopper. A Hancor employee must be present when sampling occurs. Driver should not climb on top of the truck with out proper fall protection. This is a safety issue like rail car sampling of top compartments. Fill out Form LAB-F-2 and send form and sample bag with proper material identification to the Central Lab.

5. **To sample a railcar** label the sample bags as shown above and indicate which compartment the sample is taken from. Remove all seals that lock the compartments so you can open them.

6. **To sample the bottom rail car compartments** by placing the sample bags at each opening with a bucket underneath to prevent spillage. Turn the handle or knob to open the compartment. Material will fall into the opening.

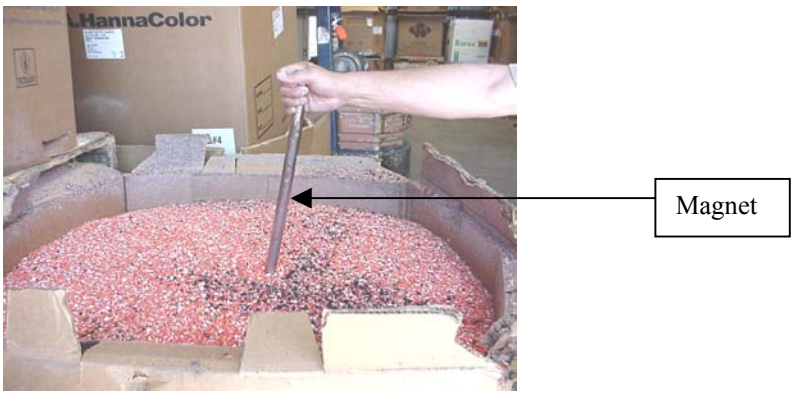
7. Sample enough material to fill the sample bag ¾ full minimum. Fill out form LAB-F-2 and send form and samples to Central Lab.

8. **To sample regrinds or virgin pellets in gaylord boxes.** Remove each lid and look at material for visual contamination (large chucks, metal, wood, paper, animal parts, etc). Insert the grain probe into top corner of box to bottom corner of opposite side. Make sure probe is closed. After inserting probe open the probe to let material in. Shake the probe while open to get the material to fill the probe. Before probing the box, the RM coordinator will inspect the box for any hazardous warning labels and will look for any leaking substance from around the bottom of the box container. After probing the box look for oily material or other potential hazardous substances. The RM coordinator has the authority to reject the material if the material poses an unsafe risk. The RM coordinator will contact the buyer who will determine disposition of

material with supplier.

9. Place material into sample bag. Fill out form LAB-F-2 that is located on the "H" drive in the folder labeled "RM Tests". Open this folder and click on "In-Process". Locate your branch folder and click on it. Open the file called LAB-F-2. Fill out the electronic copy of LAB-F-2 including the Vendor, PO. Number and designate how you want it tested, silo blend or box to box. List any contaminates in the appropriate spaces provided beside each box number. Use the comment box to list any concerns. Save this electronic copy by clicking on the File and Save As. Scroll down to the highlighted box that says LAB-F-2 and change this to the PO number and click save. This now becomes a permanent record of this Purchase Order number. If you save this electronic copy just by hitting the save button, you will loose the original LAB-F-2 blank sheet. Print a copy of this form and include it in the box of samples being sent to the Central Lab.

10. **For all Regrind gaylord boxes.** Lid must be removed and then insert **magnetic probe** in to box and swirl it around 3 times. Remove the probe and check for metal if attached to probe. If metal is present place metal in a separate sample bag and place in the sample bag that corresponds with box number and send to Central lab. Note this on the Form Lab – F-2.



5.0 NON-CONFORMING RESPONSE

During the sampling process, if there are problems with the materials such as:

a. particle size of materials larger than 3/8"
b. material that is too fluffy, light, filmy
c. non-polyethylene material
d. hazardous (i.e. foul smelling or irritating to eyes)

Contact the raw material buyer and follow the RM-WI-6, raw material rejection procedure.

6.0 RELATED DOCUMENTATION

- Raw Material Rejection procedure, RM-WI-6
- Raw Material Test sheet, LAB-F-2
- Raw Material Sampling and Testing Guidelines LAB-F-10
- Raw Material Receiving instructions, RM-WI-2

7.0 CHANGE HISTORY

This document was originally issued on July 24, 2000 at Revision 0. It has been revised as follows:

DATE	REVISION DETAILS	REVISION LEVEL
5-8-02	Adding verbiage dealing with hazardous materials identification and disposition - see step 10. Took out verbiage relating to sampling railcar top compartments and hopper trucks.	1
9-24-02	Updated correct form numbers from RM # to LAB	2
1-15-03	Added instructions about RM-Tests and "In-Process" Folders	3
8-26-03	Step 4 added the requirement that the driver at the time of delivery will get sample from traverse line and give to Hancor associate.	4
12-29-03	Added verbiage removing each lid for regrinds for visual inspection. Also, added verbiage in the Safety section concerning hazardous materials.	5
1-12-04	Step 4 added "A Hancor employee must be present when sampling occurs.	6

Hancor® STANDARD OPERATING PROCEDURE	SOP: 8.1 Page 1 of 8
TITLE: Central Laboratory Operations and Scope	**Revision Date:** 8-24-04 **Revision Level:** 6

Issued by: D.Gonso	Approved by:	Date: 11/1/00

1.0 PURPOSE

The purpose of this standard operating procedure is to provide a guideline for work activities within the Central Lab. Also, this procedure will define how and when the Central Lab interfaces with the Plants, engineering or any other administrative department that may deal with production, customer and quality issues.

2.0 SCOPE

The Central Lab provides several services to the Manufacturing plants, Engineering, Sales and Marketing and other departments that needs help and support with satisfying customer's need. The customers may be internal customers such as Engineering or Sales or external customers who may need Certifications for product they purchase from Hancor. Some of the services that the Central Lab provides are

- incoming material testing,
- finish product performance testing, see SOP 8.2 – Central lab Finish Product Testing
- providing testing support to R&D activities,
- supporting problem solving teams,
- investigating customer complaints and writing reports on findings,
- writing test and inspection procedures,
- analyzing production data and making recommendations,
- helping to qualify vendors through on site audits and testing their materials,
- analyzing competitor products and providing information to Marketing and Engineering, and
- providing training to plants relative to material and QC functions.
- provide calibration services to local plants

The Plants testing capability is identified in Table 3 below. The plants are also capable of all dimensional tests requirements. Raw material testing is done by the Central Lab. However, the plants have the ability to run contamination tests on purchased regrinds.

Table 1 below shows the Customer Standards our products are tested to. **Table 2** shows the Raw Material test procedures. **Table 3** shows the product performance standards tested to and **Table 4** shows a list of test equipment used in the Central Lab.

Table 1
Customer Standards

Product Standard [1]	Hancor products associated with standard
ASTM F405 – Corrugated Polyethylene Tubing & Fittings	3" – 6" pipe and fittings
ASTM F667 – Large Diameter Corrugated Polyethylene Pipe and Fittings	8" – 24" pipe and fittings
ASTM F810 – Smoothwall Polyethylene (PE) Pipe for use in Drainage and Waste Disposal Absorption Fields	3" – 8" smoothwall pipe
AASHTO M252 – Corrugated Polyethylene Drainage Pipe	75mm – 250mm (3"-10") pipe and fittings
AASHTO M294 – Corrugated polyethylene Pipe	300 mm- 1500mm (12"-60") pipe and fittings
ASTM D3212 – Joints for Drain and Sewer Plastic Pipes using Flexible Elastomeric Seals.	Various diameters. All dual wall products.

[1] – **AASHTO** – American Association of State Highway Transportation Officials. **ASTM** = American Society for Testing Materials.

Table 2
Raw Material Test Procedures

Lab Test Procedure	Procedure #	Reference Standard(s)
Tecrad Density	LAB-WI-11	ASTM D4883- Density of polyethylene by the Ultrasound Technique
Gradient Column density test	LAB-WI-14	ASTM D1505792 – Density of Plastics by the Density-Gradient Technique
Melt Index	LAB-WI-10	ASTM D1238 – Flow Rates of Thermoplastics by Extrusion Plastometer
Flexural Modulus	LAB-WI-08	ASTM D790 – Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials and as altered by AASHTO M294 – Corrugated Polyethylene Pipe, 300-1200 mm Dia.
Tensile Test	LAB-WI-17	ASTM D638 – Tensile Properties of Plastics and as altered by AASHTO M294 – Corrugated Polyethylene Pipe, 300-1200 mm Dia.
ESCR Test	LAB-WI-12	ASTM D1693 – Environmental Stress Cracking of Ethylene Plastics
NCLS Test	LAB-WI-05	ASTM F-2136 –Standard Test Method for Notched, Constant Ligament-Stress (NCLS) Test to Determine Slow-Crack-Growth Resistance of HDPE Resins or HDPE Corrugated Pipe
C.B. %	LAB-WI-02	ASTM D1603 – Standard Test for Carbon Black in Olefin Plastics
Flex/Izod/Tensile Bar Preparation	LAB-WI-03	ASTM D 1928 – Preparation of Compression Molded Polyethylene Test sheets and Test specimens
Izod Impact test	LAB-WI-31	ASTM D256 – Impact Resistance of Plastics and Electrical Insulating Material
Contamination Test	LAB-WI-04	N/A
IR Scan	LAB-WI-13	N/A
Extruder Test	LAB-WI-06	N/A

Table 3
Product PerformanceTests

Lab Test Procedure	Test Location Capability	Procedure #	Reference Standard(s)
P.I.I. Lo-Test	Plant & Central Lab	VM-19	ASTM D2412 – Determination of external Loading Characteristics of Plastic Pipe by parallel-Plate Loading and as modified by AASHTO M294
P.I.I. – Instron Test	Central lab	LAB-WI-20	ASTM D2412 – Determination of external Loading Characteristics of Plastic Pipe by parallel-Plate Loading and as modified by AASHTO M252

Large Diameter Impact Test	Plant & Central Lab	VM-17	ASTM D2444 – Determination of the Impact resistance of Thermoplastic Pipe and Fittings by Means of a Tup (Falling Weight) and by AASHTO M294
Flat plate Impact Test	Plant & Central Lab	VM-17	AASHTO M252
Smoothwall Impact Test	Plant & Central Lab	VM-28	ASTM D2444 – Determination of the Impact Resistance of Thermoplastic Pipe and Fittings by Means of a Tup (Falling Weight) and by ASTM F810
% Stretch-Pipe	Central lab	LAB-WI-07	AASHTO M252
Joint Integrity Test – Lg Dia. Pipe	Plant & Central lab	VM-37	AASHTO M294
Pipe ESCR Test	Plant & Central Lab	VM-38	ASTM D1693 – Environmental Stress Cracking of Ethylene Plastics and by AASHTO M252M294
Joint Integrity for Small Diameter Singlewall Pipe	Central lab	LAB-WI-07	AASHTO M252
Low Temperature Flexibility	Plant & Central lab	VM-21	AASHTO M252

Table 4
Central Lab Equipment List

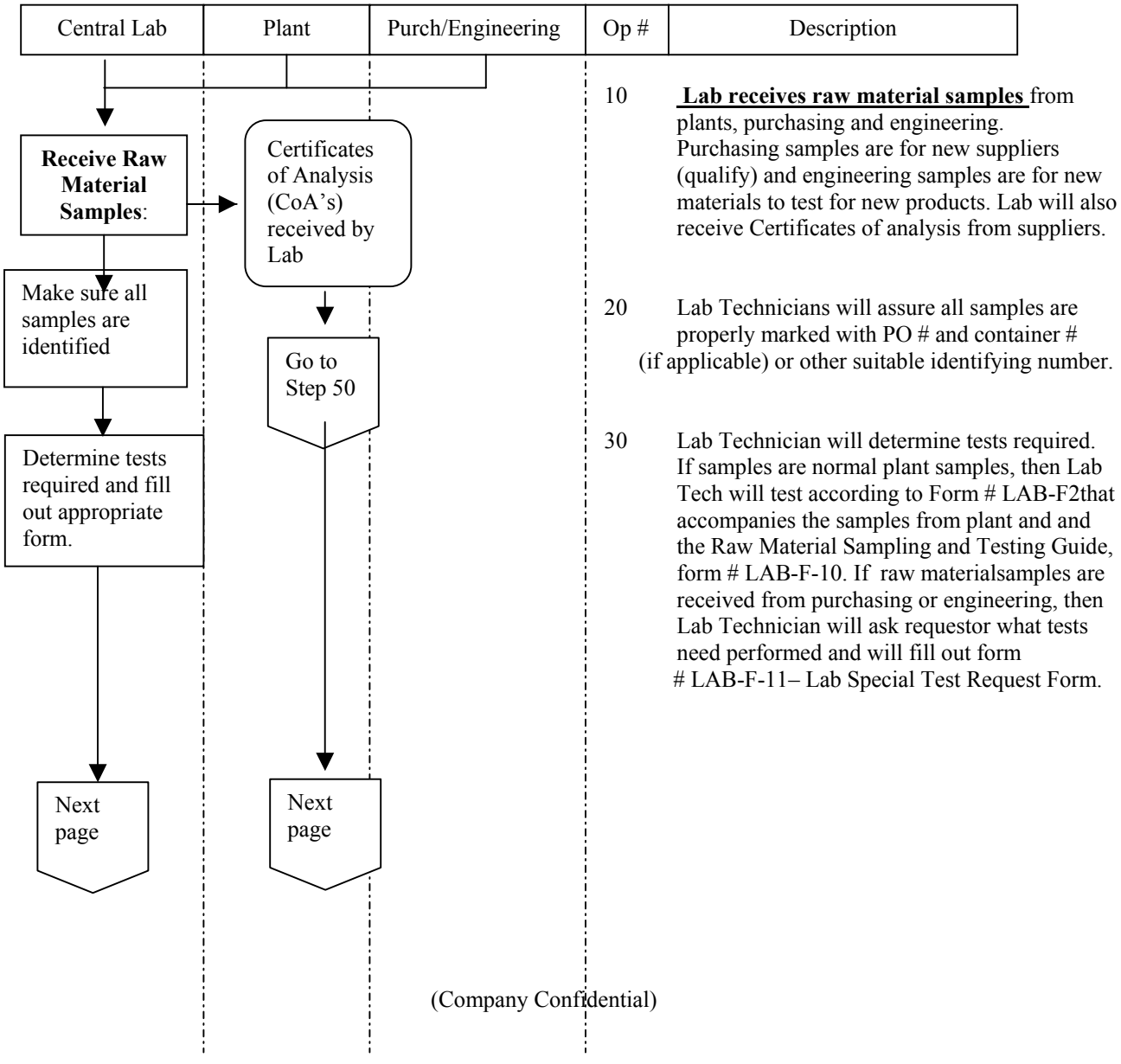
Equipment Name	Model # (if applicable)	Primary Use
Lo-Test	103670	Pipe Stiffness tests
Instron	55R1122	Pipe stiffness testing and raw material testing (Flexural modulus and Tensile tests)
Melt Index – Slocomb	Model B	Raw material testing
Melt Index – Kayeness Inc.	2054-11C	Raw material testing
Carver presses	Model C	Sample preparation
TensilKut		Mill sample test bars
TMI-Notching Cutter	TMI 43-15-3	Notch Izod bars
Powermatic Bandsaw		Rough cut sample specimens
BTI NCTL machine	AA-S-AA-000	NCTL material testing
Jet Arbor press	AP-2	NCTL Cutter press
Howe Weigh Scale - Platform	5400	Weigh pipe/fittings
Berlyn Lab Extruder		Extrude/Compound material test
Thermacool walk-in freezer		Condition impact samples
Omega Shadowgraph (2)	4112-MB	Weigh scale
Lab Line ESCR test bath	3000	Material test
Blue M Muffle Furnace		Clean boats
Mettler Balances (2)	H78AR	Weigh Samples
TMI Izod Tester	TMI 43-1	Izod Impact Tester
Perkin Elmer Spectrometer	Paragon 500	Material test
Linberg/Blue Oven (1)		% C.B. test
Tecrad	DS500	Density Test
Impact Testers (3)	**N/A**	Large dia, smoothwall, and small dia. products

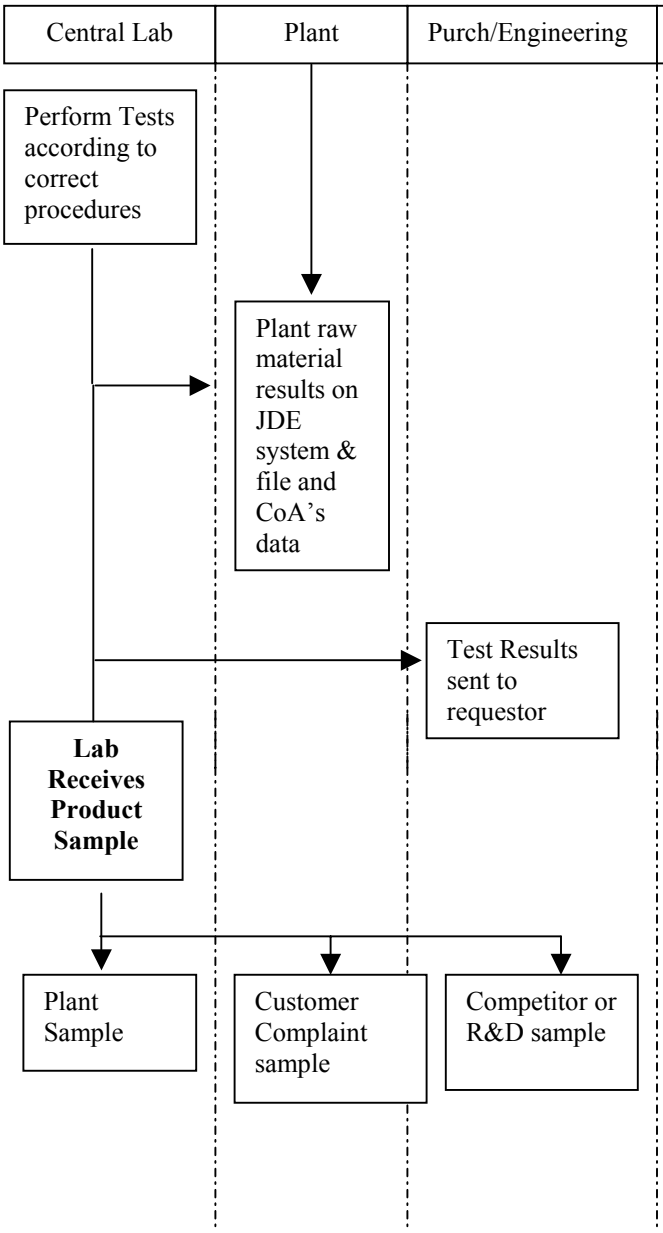
3.0 RESPONSIBILITY

The VP of Operations is ultimately responsible for this procedure being followed. The Quality Function Leader is directly responsible for the quality of output from the Central Lab and to provide the necessary training for Lab personnel. The Lab Technicians are responsible for following this procedure and all procedures referenced within.

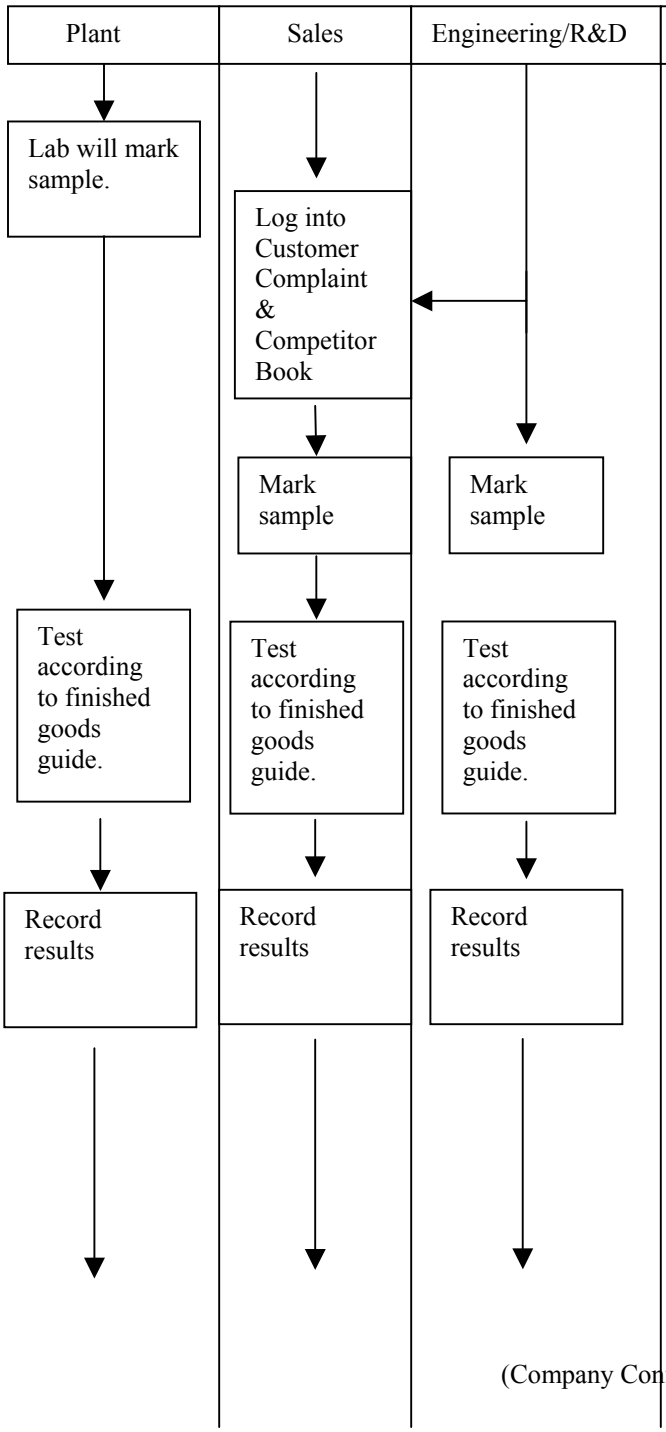
4.0 PROCEDURE

Central Lab Raw Material Sample Identification, Traceability & Testing Process

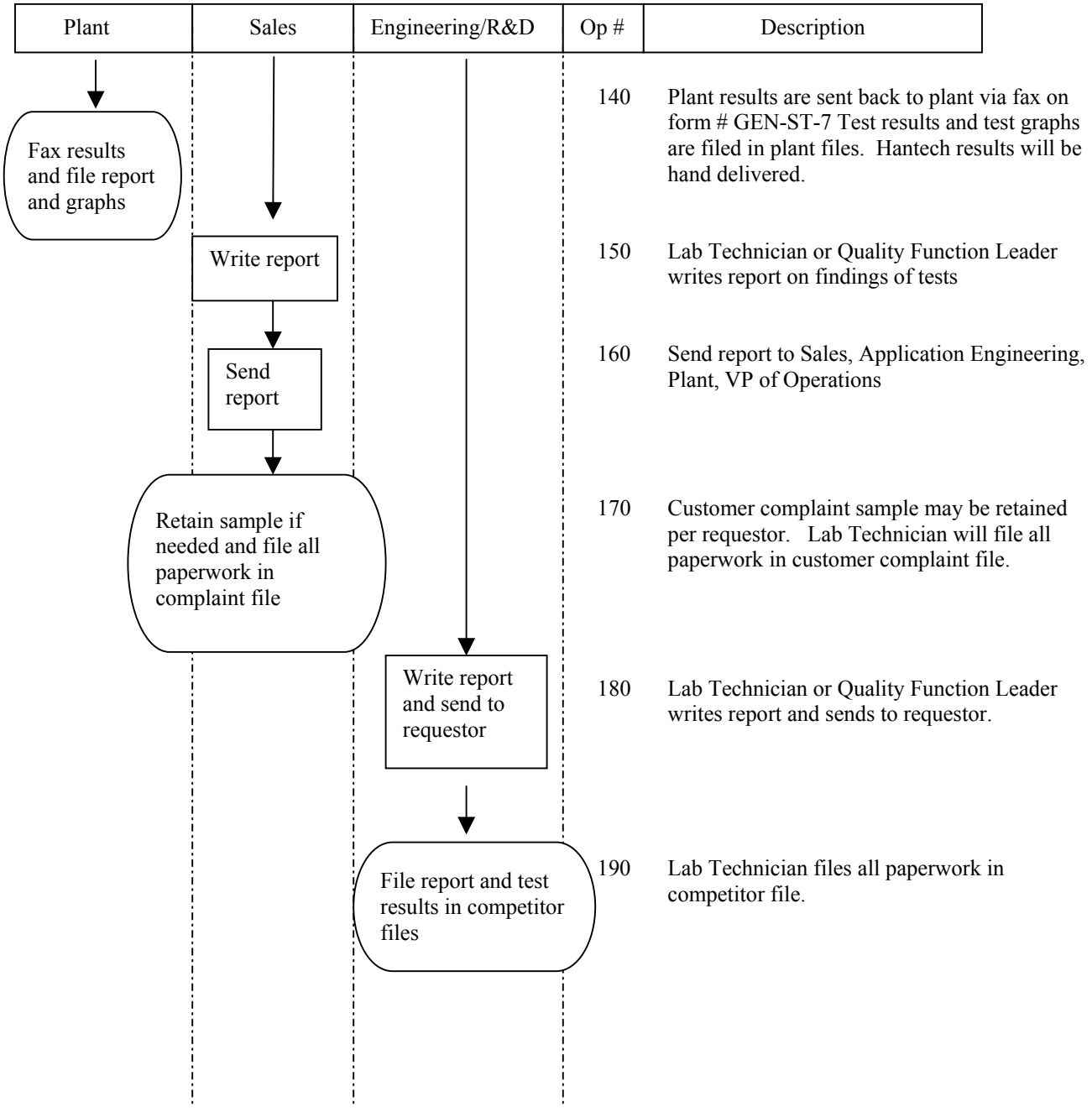




Op #	Description
40	Lab Technician will perform the tests according to the proper test procedure. Using the file folder on the "H" drive labeled RMTEST, the technician will locate the two folders, labeled IN PROCESS and FINISHED. Each plant has their own folder within these two folders. The raw material is saved under the P.O. number issued by purchasing. All test results will be recorded here and then moved to the FINISHED folder when complete.
50	Lab Technician will enter the test results for plant materials and CoA's into the Optimizer so the plants can use material for preparing blends for production.
60	The results for Purchasing or Engineering (requestors) will be sent back to them using form # LAB-F-11as appropriate.
70	**Central Lab receives product sample** from different areas. Plant samples are for Quality Assurance auditing purposes.
80	These areas include Hancor plants, Hancor Sales people and Hancor engineers. Samples are for production or certification testing, analyzing customer complaints, or determining competitor's material and dimensional characteristics.



Op #	Description
90	Lab will mark plant samples to identify date code if not already marked.
100	Customer complaint samples will be logged into Customer Complaint and Competitor Book. Competitor samples will be logged into book.
110	Lab Technician will mark all samples with the customer complaint number and name of competitor and date sample received.
120	Test the plants samples per finish goods guide. (See SOP 8.2) Test competitor and customer complaint samples per form LAB-F-3which will have the tests needed marked with an X by the requestor.
130	Record test results on form # LAB-F-3 for both Competitor and Customer complaint samples.


Plant
Sales
Engineering/R&D
Op #
Description
Fax results and file report and graphs
Write report
Send report
Retain sample if needed and file all paperwork in complaint file
Write report and send to requestor
File report and test results in competitor files
140 Plant results are sent back to plant via fax on form # GEN-ST-7 Test results and test graphs are filed in plant files. Hantech results will be hand delivered.
150 Lab Technician or Quality Function Leader writes report on findings of tests
160 Send report to Sales, Application Engineering, Plant, VP of Operations
170 Customer complaint sample may be retained per requestor. Lab Technician will file all paperwork in customer complaint file.
180 Lab Technician or Quality Function Leader writes report and sends to requestor.
190 Lab Technician files all paperwork in competitor file.

5.0 RELATED DOCUMENTATION

The following documents are referenced in preparing this SOP.

- LAB-F-2
- LAB-F-3
- LAB-F-11
- Form # LAB-F-10–Raw Material Sampling and Testing Guide (in Raw Material Process Manual) & SOP 8.2
- Document and Data Control SOP 5.4
- Control of Quality Records SOP 5.6
- Finish Goods Testing Guide (attached)

6.0 DOCUMENT RETENTION REQUIREMENTS

All test forms/records referenced in above procedure will be kept for 5 years by the plant or lab that conducts the tests.

7.0 CHANGE HISTORY

This document was originally issued on November 1, 2000 at Revision 0. It has been revised as follows:

DATE	REVISION DETAILS	REVISION LEVEL
1/4/01	Changes made per C.A.R. # 58	1
8-30-02	Changed CL-#'s to LAB-WI and VM #, spelling & grammar	2
9-23-02	Form Number Update	3
10-30-02	Added information about RM test folders on the "H" drive	4
1-10-03	Added info about plants capability in Table 3 and stated in OP70 the samples from plants to Lab are QA audit samples	5
8-24-04	Removed AASHTO MP7 from this SOP.	6

1.0 PURPOSE/SCOPE

The purpose of this Standard Operating Procedure is to describe what happens when product is found to be non-conforming or out of specification. Product can be anything from raw materials to pipe and fittings that are returned from a customer. It is very important to prevent non-conforming raw material to be used in the manufacture of pipe or fittings. Likewise, pipe or fittings that are non-conforming due to processing cannot be shipped to the customer. Therefore, this procedure will help describe, along with work instructions, how Hancor identifies and segregates product from production and how product is prevented from being shipped to our customers. All manufacturing areas will use this procedure and any work instructions associated with controlling non-conforming material.

2.0 RESPONSIBILITY

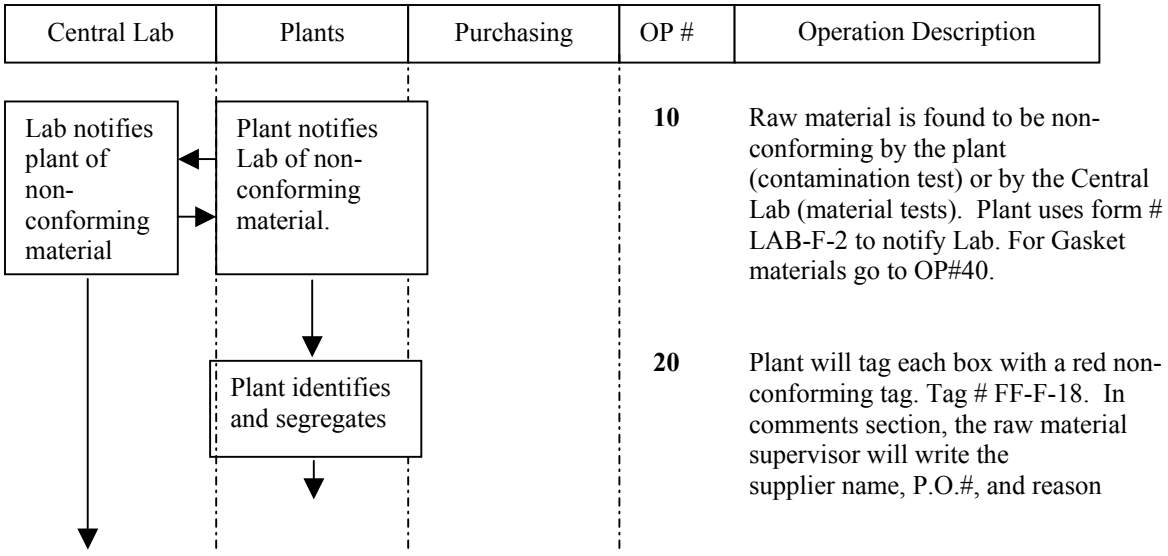
It is the over all responsibility of the Vice –President of Operations to see that the plants use and follow this procedure. Also, the Plant Managers and other manufacturing supervisors are responsible to see that all non-conforming products are identified and segregated from conforming products.

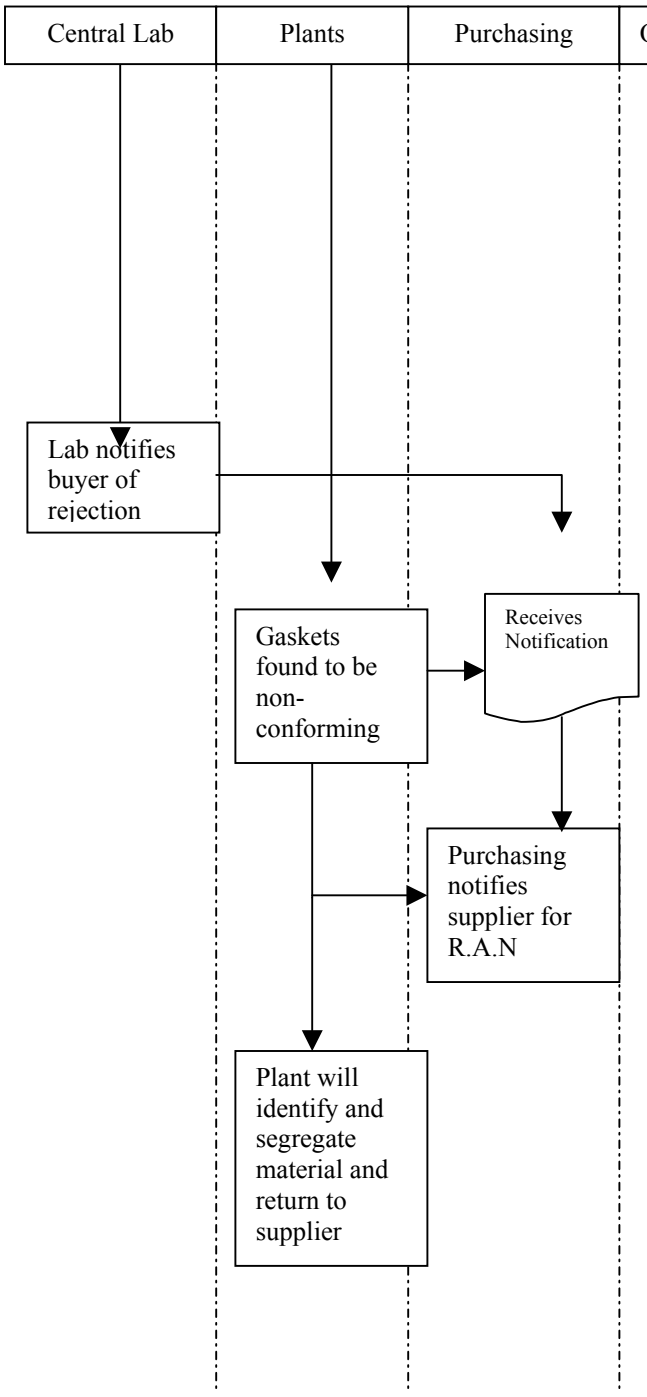
3.0 PROCEDURE

The following procedures and flow charts will describe how non-conforming products are identified, segregated and disposed in the following areas or operations:

a. material at receipt,
b. blending operation**,**
c. in process production,
d. final product characteristics.

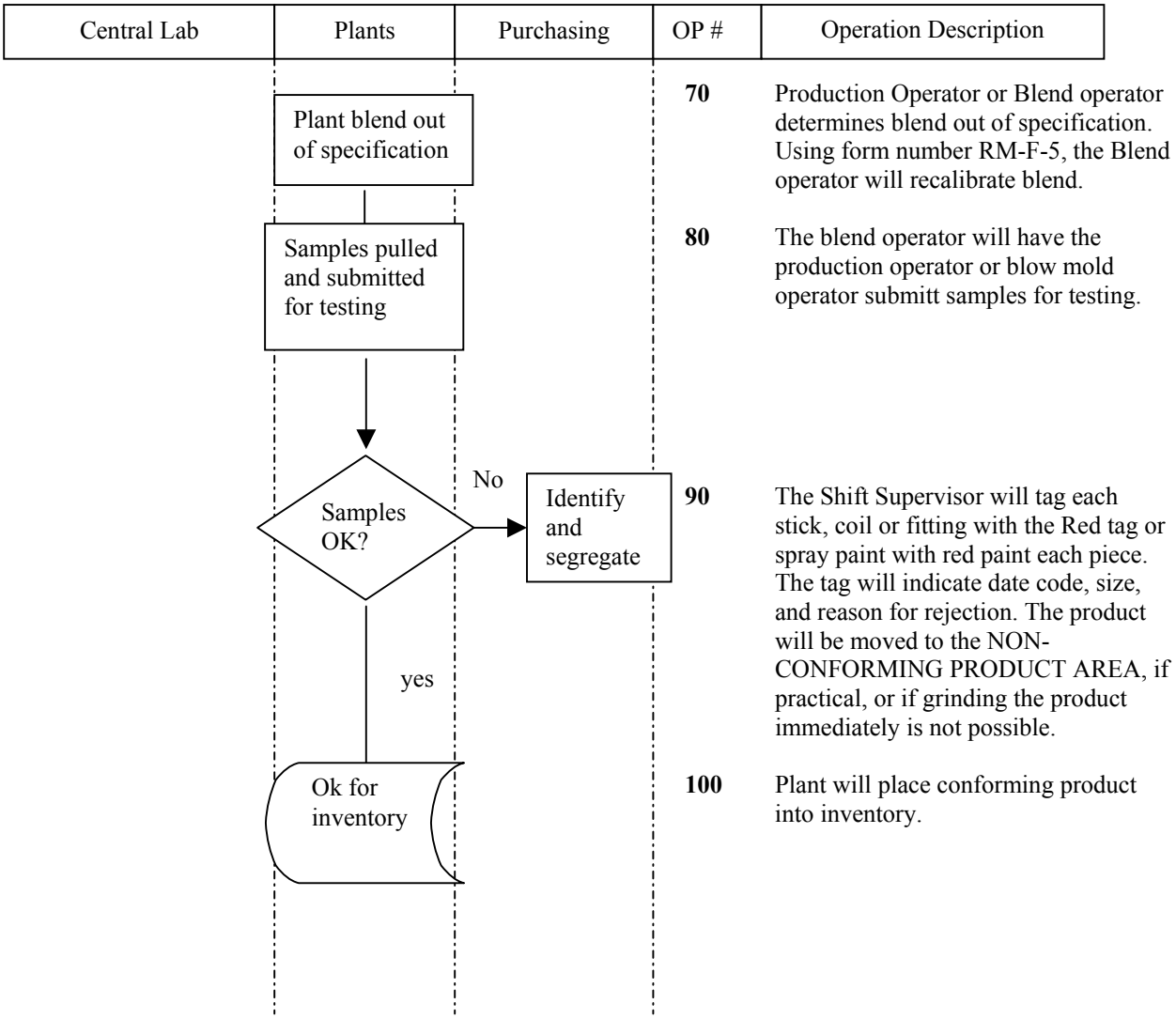
Material at Receipt





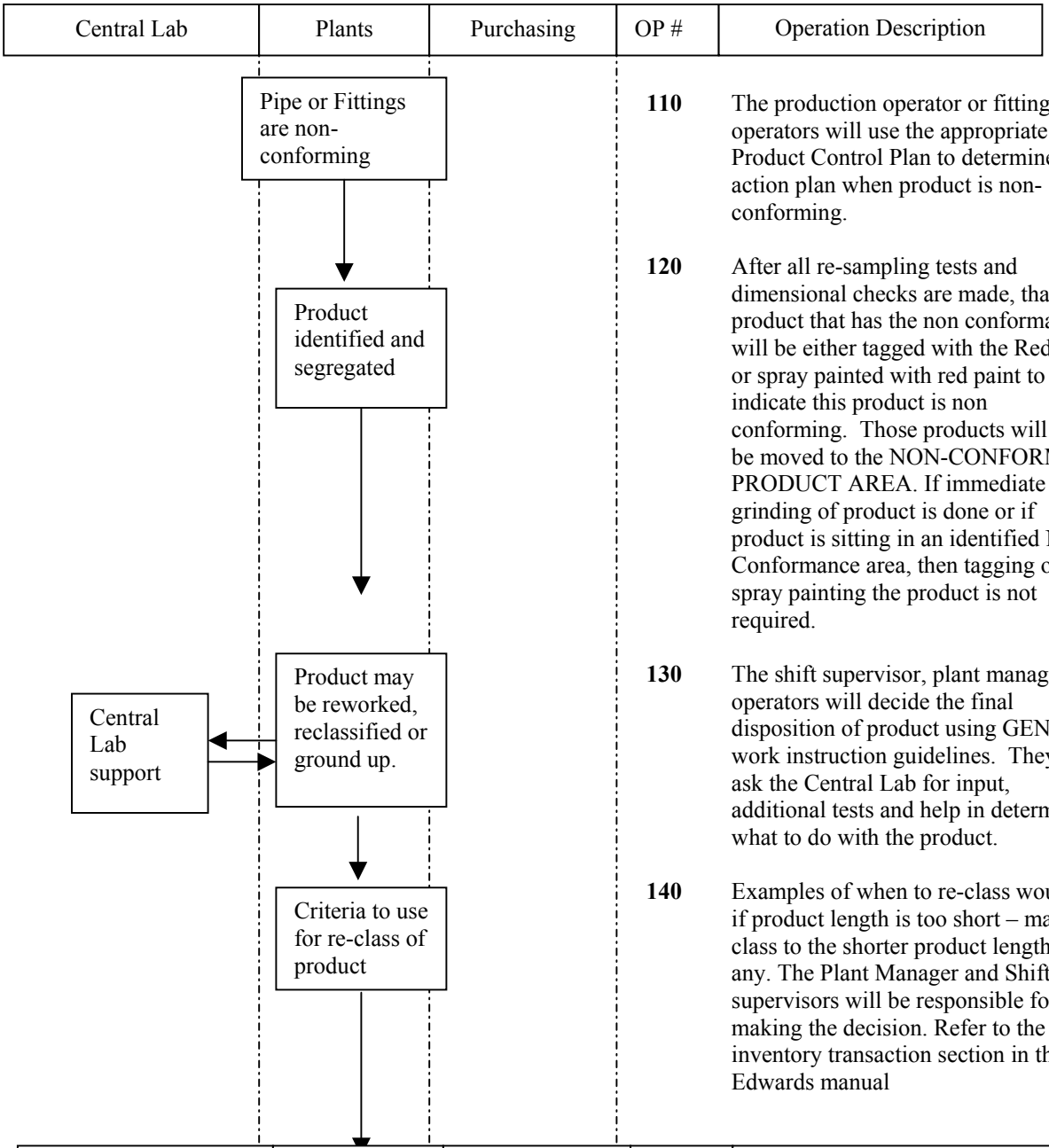
	OP #	Operation Description
		for rejection. All boxes will be moved to the area marked in the plant or outside the plant as NON-CONFORMING PRODUCT AREA. If the material is a rail car, the material supervisor will place the same tag with the same information on each of the ports on the bottom of the railcar.
	30	Central Lab notifies the Raw Material Buyer via the H: drive using the LAB-F-2 form with the Purch-F-101form attached to it.
	40	If gaskets are found to be non-conforming, the plant will notify the Purchasing Department.
	50	The Purchaser will notify supplier for Return Authorization Number (R.A.N) if required.
	60	Plant will tag each box of gaskets with a red non-conforming tag. Tag # FF-F-18. In comments section the receiving clerk will write the supplier name, P.O.#, and reason for rejection. All boxes will be moved to the area marked in the plant or outside the plant as NON-CONFORMING PRODUCT AREA.

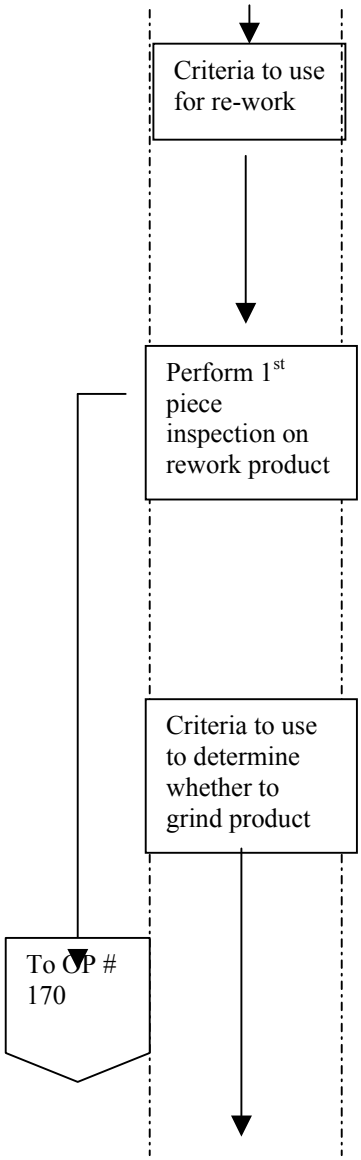
Blending Operation



In Process Production

1. This area addresses what the operator does when a process parameter is outside the tolerances set in Process Specification and Control Plan form. This covers the pipe and blow mold fittings manufacturing area. The Process Specification and Control Plan form details the activities and actions the operator will follow when a process parameter is not within the tolerances.

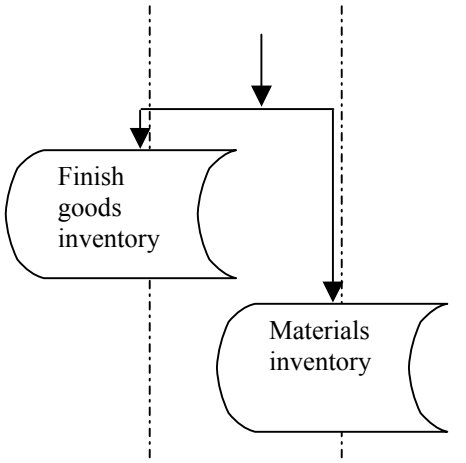




150 Criteria that the Plant Manager and Shift supervisors would use would be: can the product be changed into another product type without changing the structural integrity? For example, if the in-line bell was damaged the rest of the pipe could be made into Hi-Q type product.

155 When product is reworked into another discrete product such as plain pipe to drilled or making shorter length pipe, then a first piece must be done on a sample of the new product to verify that the rework or change is acceptable. Only the change needs verified (i.e. perforations or length). If the rework is simply making the current product acceptable such as in de-burring the ends then no 1st piece is required.

160 If the product fails the performance test requirements such as impact, pipe stiffness and pipe flattening then the product will be ground up after a re-sampling has taken place. If the pipe or fittings are damaged, in the plant or the yard, to the point they cannot be used, then they will be ground up. Products returned from customers that do not meet product specifications will be ground up.



170 After product disposition has been made (either rework and re-class or regrind) the product is returned to finish goods inventory or the regrind is returned to the materials inventory. See GEN – WI –1-Prod work instruction for process of testing and retesting product.

4.0 RELATED DOCUMENTATION

The following documents are referenced in preparing this SOP and support the SOP through specific work instruction:

- JD Edwards inventory manual
- Raw Material Control Plan - Internal Controlled Documents
- Production and Process Control Plans – Internal Controlled Documents
- GEN-WI-1-Prod – Work Instruction

5.0 AMENDMENT HISTORY

This document was originally issued on November 1, 2000 at Revision 0. It has been revised as follows:

Date	Description of revision	Level
2/7/01	Added OP 155 to explain need for 1st verification when changing or reworking product.	1
3/30/01	Added to OP# 120 the statement " If immediate grinding of product is done or if product is sitting in an identified Non-Conformance area, then tagging or spray painting the product is not necessary." Changed OP# 90 to add the following "The product will be moved to the NON-CONFORMING PRODUCT AREA, if practical, or if grinding the product immediately is not possible."	2
12-5-01	Added verbiage regarding using "GEN –WI_1_Prod guidelines and process in OP#'s 130 and 170.	3
1-17-03	Form # change and updated OP#30 re: Electronic H drive notification	4

1.0 PURPOSE/SCOPE

The purpose of this work instruction is to identify the in-process **Quality Control** and **Quality Assurance** testing for **AASHTO M-252, M-294, and ECO First (12"-60" dual wall)** products. This work instruction will identify the specific requirements for **Quality Assurance** testing. **Quality Control** testing will be discussed briefly, however, the specifics of Quality Control testing can be found in existing Control Plans and Verification Methods Sheets. **Quality Control** and **Quality Assurance** are defined as follows.

Quality Control (QC) testing are those requirements for testing which Hancor has developed and performs in specific ways (methods) and times which help us insure the product being produced will meet the necessary outcome. These test requirements are the task or quality checks that all Hancor Operators are currently responsible for completing. The tests are performed as specified in the Product Specification Control Plans and are used to insure the process is in control. These tests are completed as specified in the appropriate Verification Methods and are separate from the **Quality Assurance** test requirements that will be described in this Work Instruction.

Quality Assurance (QA) is a **secondary and separate** process from Quality Control in that it's purpose is to confirm "or ***Assure***" that the Quality Control Procedures are working and the product manufactured is meeting the required specification. This testing process is used as acceptance testing of products for customer certification and release.

2.0 RESPONSIBILITY

Line operators are responsible for taking samples at the appropriate time and quantity as specified in the procedure section of this Work Instruction. Operators are responsible for labeling and documenting the samples, and their results, as specified in this work instruction.

Plant personnel are responsible for transporting the samples from the source of production to the testing Lab. A shipping/receiving document will be used to verify the transfer of product occurred at the appropriate time.

Lab Technicians or personnel assigned by Plant Management are responsible for testing the product samples as specified. They are responsible for documenting the results and forwarding those results to the appropriate facility.

The Shift Supervisor and/or Production Manager is responsible for receiving the results from the lab, providing the results to the appropriate operator, and for notifying the yard of the products approval or rejection.

Yard Personnel are responsible for quarantining product while product is pending test results. They are responsible for receiving confirmation from the Production Manager of the tests results before releasing product for shipping purposes.

3.0 SAFETY

Practice care and observe all safety regulations when cutting samples for each test identified below.

4.0 PROCEDURE

When producing AASHTO M-252, M-294 and 12" –30" ECO-First products, the following Quality Assurance test procedure is required. For 3"-10" products produced using purchased regrinds that are to be sold to DOT projects **(prior approval and acceptance required)** this procedure will be followed also. NOT ALL STATE DOTs ACCEPT REGRIND USE IN SMALL DIAMETER PIPE. See Eastern States Consortium requirements. Contact Central Lab.

Samples of product must be pulled from the production run as specified in the matrix below.

Sampling Plan for 12" - 60" AASHTO Pipe Products and 12" – 30" ECO First dual wall product only-- Quality Assurance Test Process

(March 4, 2003 **(DKG)**)

The following testing must be done on all AASHTO M294 products and acceptable test results obtained before product can be shipped.

AASHTO Tests >>	**5% & 20% PII (AASHTO M294) (Section 9.1)**	**Cold Temperature Impact (AASHTO M294) (section 9.3)**	**Joint Integrity (AASHTO M294) (Section 9.5.1) (*See Note 2 at end of chart*)**	**Alignment (AASHTO M294) (Section 9.5.2)**	**Pipe ESCR (AASHTO) M294 Section (9.4)**
Verification Methods >>	See VM-19 "Determination of Pipe PII (Pipe Stiffness)"	See VM-17 "Cold Temperature Impact"	See (AASHTO M294 Section 9.5.1) See VM-37 Joint Integrity test	See (AASHTO M294 Section 9.5.2)	See VM-38 - Pipe ESCR
Test frequency (see Note 1 below)	2 day lot	2 day lot	Pull sample per production run. Per week for Oh, Vt, Ny and Nc plants (ESC)	Pull sample per production run. Per week for Oh, Vt, Ny and Nc plants (ESC)	Pull sample per production run. Per week for Oh, Vt, Ny and Nc plants (ESC)
Diameter	**Sample Size per test (number of samples per test)**				
12" DW (and ECO)	7 corrugations (3)	11 corrugations (1)	Spigot end =5 corrugations Bell end = 5 corrugations	Use sample assembly prior to Joint Integrity test	1 corrugation ring cut into quarters
12" SW	7 corrugations (3)	11 corrugations (1)	Spigot end =5 corrugations Bell end = 5 corrugations	" "	1 corrugation ring cut into quarters
15" DW (and ECO)	8 corrugations (3)	10 corrugations (1)	Spigot end =4 corrugations Bell end = 3 corrugations	" "	1 corrugation ring cut into quarters
15" SW	8 corrugations (3)	10 corrugations (1)	Spigot end =8 corrugations Bell end = 8 corrugations	" "	1 corrugation ring cut into quarters
18" DW (and ECO)	7 corrugations (3)	8 corrugations (1)	Spigot end =4 corrugations Bell end = 3 corrugations	" "	1 corrugation ring cut into quarters
18" SW	7 corrugations (3)	8 corrugations (1)	Spigot end =6 corrugations Bell end = 6 corrugations	" "	1 corrugation ring cut into quarters
24" DW (and ECO)	7 corrugations (3)	7 corrugations (1)	Spigot end =4 corrugations Bell end = 3 corrugations	" "	1 corrugation ring cut into quarters

24" SW	7 corrugations (3)	7 corrugations (1)	Spigot end =5 corrugations Bell end = 5 corrugations	,,,, ,,,,	1 corrugation ring cut into quarters
30" DW (and ECO)	8 corrugations (3)	7 corrugations (1)	Spigot end =2 corrugations Bell end = 3 corrugations	,,,, ,,,,	1 corrugation ring cut into quarters
36" DW	8 corrugations (3)	6 corrugations (1)	Spigot end =2 corrugations Bell end = 2 corrugations	,,,, ,,,,	1 corrugation ring cut into quarters
42" DW	8 corrugations (3)	6 corrugations (1)	Spigot end =2 corrugations Bell end = 2 corrugations	,,,, ,,,,	1 corrugation ring cut into quarters
48" DW	9 corrugations (3)	6 corrugations (1)	Spigot end =2 corrugations Bell end = 2 corrugations	,,,, ,,,,	1 corrugation ring cut into quarters
54" DW	8 corrugations (3)	6 corrugations (1)	Spigot end =2 corrugations Bell end = 2 corrugations	,,,, ,,,,	1 corrugation ring cut into quarters
60" SW	9 corrugations (3)	6 corrugations (1)	Spigot end =2 corrugations Bell end = 2 corrugations	,,,, ,,,,	1 corrugation ring cut into quarters

Note 1: A Plant can pull samples and create smaller lots if they want to. For example a lot could be every 24 hrs or every shift. There will be more testing to do and more space for conditioning will be required with smaller lots. Some state DOT's will require a different schedule than the one above. See page 5 Quality Assurance Sample Submittal Schedule below to determine how 2 day lots are established.

To minimize the scrap due to sampling, use the remainder of the stick that was used for QC samples.

Note 2: For non Sure-Lok pipe, provide the most common coupler (i.e. split coupler) with the samples for Jt. Integrity testing. See VM-37 verification method.

AASHTO Tests >>	5% & 20% PII (AASHTO M252 Section 9.1)	Cold Temperature Impact (AASHTO M252 section 9.5)	Elongation (AASHTO M252 Section 9.3	Strength (AASHTO M252 Section 9.8.1)	Low Temp. Flexibility (M252) Sec. 9.6 Coiled pipe only	Pipe ESCR (AASHTO M252 Section 9.4)
Verification Methods >>	Instron LAB-WI-0 Lo-test VM-22	See VM-17 "Cold Temperature Impact"	See W.I. (LAB-WI-07)	See VM-37	See VM-21	See VM-38 - Pipe ESCR
Test frequency (see Note 1 below)	2 day lot	2 day lot	Pull sample per production run. Per week for OH, VT, NY and NC plants (ESC)	Pull sample per production run. Per week for OH, VT, NY and NC plants (ESC)	Pull sample per production run Per week for OH, VT, NY and NC plants (ESC)	Pull sample per production run. Per week for OH, VT, NY and NC plants (ESC)
Diameter	**Sample Size per test (number of samples per test)**					
4" DW	19 corrugations (3) 24" long sample (3)	29 corrugations (1)	N/A	(2) - 19 corrugations plus 1 coupler	N/A	1 corrugation ring cut into quarters
6" DW	17 corrugations (3) 24" long sample (3)	26 corrugations (1)	N/A	(2) - 17 corrugations plus1coupler	N/A	1 corrugation ring cut into quarters
8" DW	12 corrugations (3) 18" long sample (3)	18 corrugations (1)	N/A	(2) - 12 corrugations plus1coupler	N/A	1 corrugation ring cut into quarters
10" DW	18" long sample (3)	12 corrugations (1)	N/A	(2) - 7 corrugations plus 1 coupler	N/A	1 corrugation ring cut into quarters
4" SW	17¼ corrugations (3) 24" long sample (3)	26 corrugations (1)	5 foot sample (3)	(2) - 17 ¼ corrugations plus 1 coupler	5 foot sample (3)	1 corrugation ring cut into quarters
6" SW	17¼ corrugations (3) 24" long sample (3)	26 corrugations (1)	5 foot sample (3)	(2) - 17 ¼ corrugations plus 1 coupler	5 foot sample (3)	1 corrugation ring cut into quarters
8" SW	12 corrugations (3) 18" long sample (3)	18 corrugations (1)	5 foot sample (3)	(2) - 12 corrugations plus 1 coupler	5 foot sample (3)	1 corrugation ring cut into quarters
10" SW	7 corrugations (3) 18" long sample (3)	11 corrugations (1)	5 foot sample (3)	(2) - 7 corrugations plus 1 coupler	5 foot sample (3)	1 corrugation ring cut into quarters

Upon pulling the samples, the samples are to be documented on the **QC/QA Test Result Log (form# GEN-ST-7)**. The samples are to be labeled with the appropriate identification to indicate date, shift, time pulled, operator, QC or QA, and test required. The samples should then be gathered and transferred to the Central lab or plant lab for testing. This form

will serve as a shipping/receiving document and evidence of testing and disposition of product. Staple this form to the PII test graphs. **See "Inventory Quality Assurance Sampling and Testing Process" flow chart at end of the document.**

The following schedule will be used to identify those days Quality Assurance samples will be collected and sent to the appropriate testing lab.

Quality Assurance Sample Submittal Schedule

This schedule will be used by the manufacturing plant to determine when to submit routine or change over sample sets for Quality Assurance testing. The "X's" indicate the day/s samples must be submitted for AASHTO Products Quality Assurance testing.

A change over is the only exception to this schedule. For QA testing purposes a change over is defined as, changing to a different diameter and/or changing to a different "Product Specification and Control Plan" (i.e. 15" to 12" or, 12" F477 to 12" AASHTO). A Change Over Sample Set must be submitted following each change over.

The change over sample sets can be used in place of the routine Monday, Wednesday and Friday sample sets (i.e. C/O samples on Monday, Wednesday & Friday can be used for routine Monday, Wednesday & Friday samples. Also, Saturday and Sunday C/O samples can be used for routine Monday sample, Tuesday C/O sample can be used for routine Wednesday sample, Thursday C/O sample can be used for routine Friday sample.

Routine Sample Submittal Schedule

Production Schedule per Production Line (Hrs. run)	Mon.	Tues.	Weds.	Thurs.	Fri.	Sat.	Sun.
01 – 48 hrs	X						
49 – 96 hrs	X		X				
97 – 168 hrs	X		X		X		

Note: For those plants that do not have local testing capability and have to send their samples to another lab, Monday samples may not get sent until Tuesday, Wednesday samples may not get sent until Thursday, etc. This will be dependent upon when production begins and/or availability of shipping services. For example if the plant runs the entire 7 days then there will be 3 QA lots tested. Monday/Tues, Weds/Thurs and Friday/Saturday/Sunday. If production doesn't start until Tuesday and runs the entire week then the lots will be Tues/Weds, Thurs/Friday, Saturday/Sunday.

Sample Set Descriptions (for M294, and ECO First)

Change Over Sample Set:
To include the following: 3 Pipe Stiffness samples, 1 Impact sample, 1 Joint sample and 1 ESCR sample

Routine Sample Set:
To include the following: 3 Pipe Stiffness samples and 1 Impact sample

Sample Set Descriptions (for M252)

Change over sample set for dual wall pipe:
To include the following: 3 pipe stiffness samples, 1 impact sample, 1 strength sample and 1 ESCR sample

Change over sample set for single wall pipe:

To include the following: 3 pipe stiffness samples, 1 impact sample, 1 joint sample, 1 strength sample, and 1 ESCR sample.

Routine sample set for dual wall pipe:
To include the following: 3 pipe stiffness samples and 1 impact sample.

Routine sample set for dual wall pipe:
To include the following: 3 pipe stiffness samples and 1 impact sample.

Labeling and identifying samples:

It is very important to correctly label the sample (s). This will allow the test technician to know how to condition and what test is to be done. The following information needs to be placed on the sample: Entire blend #, QA or QC (to denote 4 hr vs 24 hr conditioning times) and entire date code. Other information can include time sample taken, operator initials and type of test needed on sample (i.e. PII, impact, ESCR, etc)

The lab is to test the samples in accordance with AASHTO M294 test and product specification criteria. The lab is to document and forward the results to the appropriate facility and/or place of origination.

The Yard is responsible for quarantining the product until all Quality Assurance Tests are complete. Product pending test results will be quarantined through the use of cement barriers or other device adequate to assure that product is segregated. Signs will be attached to the barriers indicating the status of the product between barriers. No product is to be shipped while tests are pending.

Upon receiving the test results, the Shift Supervisor and/or Production Manager is to notify the operator of the results. The operator is to update the QC/QA Test Result Log Accordingly. The operator or appropriate plant personnel will update the First Piece Verification Sheet if the test completed was a QC test. The Production Manager and/or Shift Supervisor will notify the Yard of the test results.

The Yard is to remove the barriers for product that has successfully completed the appropriate QA tests. If barriers cannot be removed, the barrier sign will be updated to indicate the status of the product. The product is now available for shipment. Any notification of pipe failure, will require the product to remain quarantined between the barriers until disposition is determined.

5.0 NON-CONFORMING RESPONSE

Retest samples can be submitted for any sample failing one or more of the criteria. Retest samples should be submitted following the same procedures as stated above. If retest samples pass, the product is accepted and the barriers will be removed. Use the "Inventory Quality Assurance Sampling and Testing Process" flow chart at end of this work instruction. . Disposition will be made based upon the sampling and testing results determined through this process.

A failure of the retest samples will require further disposition in accordance with this and other test procedures.

6.0 RELATED DOCUMENTATION

Examples:

- AASHTO M252 and M294 standards
- GEN-ST-7 – QA test report
- SOP 8.5 – Non - Conforming product

6.0 CHANGE HISTORY

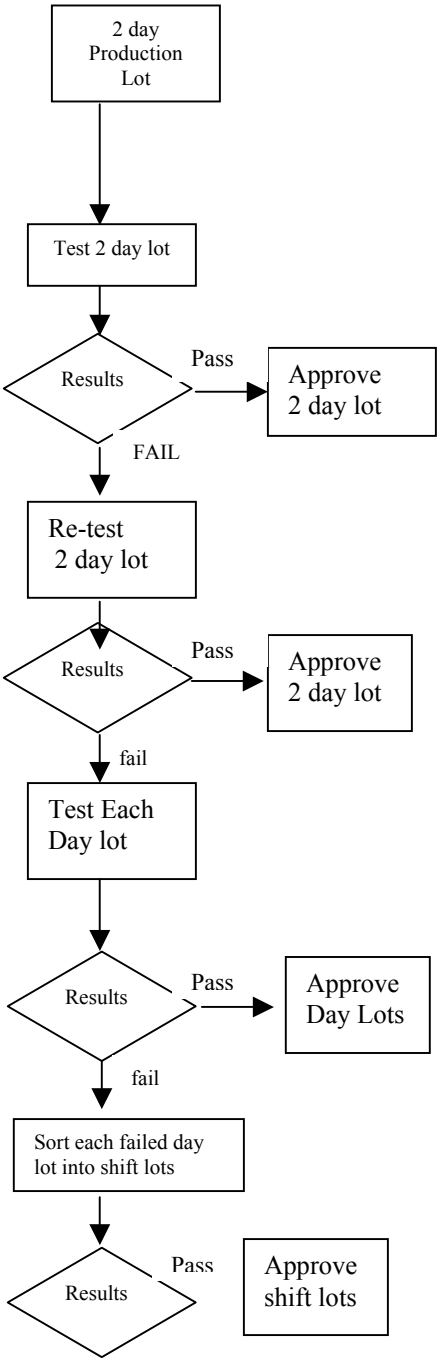
This document was originally issued on May 1, 2001 at Revision 0. It has been revised as follows:

DATE	REVISION DETAILS	REVISION LEVEL
8-2-01	Added requirements for AASHTO M252 testing at end of table	1
12-2-01	Product needs to be sent to the Central lab or the plant lab for testing also, modified instruction to include disposition when filling out GEN-F-ST7 (QCQA Log). Changed WI name.	2
1-2-02	Added flow chart at end of document visualizing this process	3
8-21-02	Clean-up grammar and misspelled words	4
1-17-03	Changed notation on test names from CL to VM	5
3-4-03	Added testing requirement for ECO first 12- 30" dia dual wall	6
6-11-03	Added verbiage on page 1 in 4.0 to state that this procedure will be followed for that product 3"-10" that is made out of purchased regrinds designated for DOT jobs. **NOT ALL STATE DOTs ACCEPT REGRIND USE IN SMALL DIAMETER PIPE.**	7
9-4-03	Added Column for Low temperature flexibility test for M2525 products. Changed sample size to 3 for elongation test per M252	8
10-7-03	Removed Reference to MP-7, General overview of this work instruction.	9
1-7-04	Changes to test frequencies related to Eastern States Consortium	10
4-15-05	Added to the 5% & 20% column to reflect testing on the Lo-Tes machine. Added to the Strength column 2-samples plus coupler	11
4-20-05	Clarified 2 day lot definition on page 5	12

See next page for "Inventory Quality Assurance Sampling and Testing Process" flow chart

Inventory Quality Assurance Sampling and Testing Process flow chart

This flow chart illustrates the process for sampling and testing pipe product and the process of re-sampling if failures occur.



1. Two days of production defines a "lot". (Product is marked with M/D/Y/s). A lot is the maximum amount of pipe that can be tested and released for AASHTO products. If prodcution happens over the weekend then the sample lot is 3 days.
2. One sample set is tested according to AASHTO M252 or M294.
3. If sample pass approve this lot for sale. Record results on Form GEN-ST-7 QA Test Report.
4. If sample fails, pull a random sample from inventory and retest pursuant to AASHTO M294 section 10.
5. If sample passes, approve lot for sale.
6. If sample fails re-test, quarantine inventory lot.
7. The quarantined lot is sorted based upon 24 hr production periods (i.e. Date Code). There should only be 2 sub lots except for weekend production. Test each sub lot as before.
8. If tests pass then approve each day lot for sale.
9. If tests fail, then sort each day lot into shift lots. Pull samples and test each shift as before.

10. If tests pass then approve each shift lot for sale.

11. If shift lots fails, shift is considered Non-Conforming.

When Non-Conforming product is identified options include: Rework to remove AASHTO designation and sell as Non-AASHTO, rework product until conforming or grind. If you elect to sell the product as Non-AASHTO then do the following steps.

A. Make sure Area Sales manager and sales rep. Are aware that non-AASHTO product will be sold. The product cannot be sold to anyone who might use it for an AASHTO job.

B. Sales person will contact customer and make sure customer understands this is Non-AASHTO pipe.

C. Plant will make sure the product is identified as Non-AASHTO by either removing the designation or by "stamping" "NON" in front of the designation.

D. All paperwork (shipping doc's) will note on them that the product is Non-AASHTO.

E. Customer awareness and understanding is CRITICAL.

QC/QA TEST RESULTS SHIPPER LOG

Delivered By:_____

Received By:_____

Date:_____ **Time:**_____

Operator:_____ **Sample Time:**_____

Date: _____ **Shift/Line:**_____

Blend No.:_____ **Product Type:**_____

Is this a QA or QC sample?:_____

Disposition of production lot(s)

1st sample:		2nd sample:		3rd sample:		4th sample:	
pass	fail	pass	fail	pass	fail	pass	fail

	Samples sent to Lab	PASS/FAIL QC RESULTS 4 HOUR TEST
	5% PII	
	20% Flatness	

	Samples sent to Lab	QA RESULTS 24 HOUR TEST
	5% PII ⌖	
	5% PII ⌀	
	5% PII ⊖	
	20% Flatness	
	Impact	
		Done Once per Run
	JT Spigot	
	Jt Bell	
	Ring (Escr)	
Final disposition of lots:	**grind**	
	reclass	

Form No: GEN-ST-7 Rev. 09/10/02 SLG

QC/QA TEST RESULTS SHIPPER LOG

Shipped By:_____

Received By:_____

Date:_____ **Time:**_____

Operator:_____ **Sample Time:**_____

Date: _____ **Shift/Line:**_____

Blend No.:_____ **Product Type:**_____

Is this a QA or QC sample?:_____

Disposition of production lot(s)

1st sample:		2nd sample:		3rd sample:		4th sample:	
pass	fail	pass	fail	pass	fail	pass	fail

	Samples sent to Lab	PASS/FAIL QC RESULTS 4 HOUR TEST
	5% PII	
	20% Flatness	

	Samples sent to Lab	QA RESULTS 24 HOUR TEST
	5% PII ⌖	
	5% PII ⌀	
	5% PII ⊖	
	20% Flatness	
	Impact	
		Done Once per Run
	JT Spigot	
	Jt Bell	
	Ring (Escr)	
Final disposition of lots:	**grind**	
	reclass	

Form No: GEN-ST-7 Rev. 09/10/02 SLG

QA Test Summary

This form is to be used for all QA test lots representing 4" – 60" diameter pipe products. (M252 and M294 products)

Keep this form with the PII Charts and file with PII charts.

Date of Test		**Date Code of Pipe**	
Diameter (VM-3)		**Blend #**	

Joint Integrity (M252 & M294) VM- 37 **PASS or FAIL**

Pipe ESCR (M252 & M294) VM-38 **PASS or FAIL**

Cold Impact (24 hr M294) VM-17 **PASS or FAIL or NA**

Cold Impact (1 hr M252) VM-17 **PASS or FAIL or NA**

Cold Bend Test (M252) VM-21 **PASS or FAIL or NA**

% Elongation (M252) LAB-WI-07 **PASS or FAIL or NA**

	5%	**10%** (if required)	**Final Yield**
PII (Pipe Stiffness M252 & M294) Seams Vertical (or Canadian) - VM-19			
Seams horizontal (or Canadian)			
Seams Diagonal (or Canadian)			

If product fails retest per Gen -WI –1 procedure and fill out new form. Include retest form with PII charts.

Comments:

_____

_____

_____

_____

_____

Form #: Gen-F-5 **8-12-05**

Blow Mold, Rotational Mold and Fabricated Fittings and associated parts.

The following info discusses what and where fittings are made. It also discusses the traceability of fittings.

Blow Mold Fittings are produced at both Ohio manufacturing facilities.

Fabricated Fittings are produced at the Waverly, New York plant and at Hantech facility in Findlay, Ohio

Source of components:
Blow Mold fittings for AASHTO products are produced out of the same material as pipe.

Fabricated Fittings are produced using pipe from the manufacturing process and also some thick walled smooth wall pipe and plate in the fabrication process. The smooth wall pipe comes from GE Polymershapes, Chicago, Illinois and the plate comes from Lee Supply (Smooth Drisco) Charleroi, PA.

Rotational Molded Fittings are produced at Diamond Plastics, Dunkirk, Ohio.

Gaskets are produced at either Elbex, Kent, OH or EPG Aurora, OH.

Traceability of materials:

All fittings are marked with month, day and year of manufacture. Records are kept for quality reviews.

Gaskets are also coded for traceablilty purposes.